REMARKS

In the last Office Action, the Examiner rejected claims 27-28 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,702,829 to Polaschegg ("Polaschegg"); rejected claims 29-30 under 35 U.S.C. § 103(a) as being unpatentable over Polaschegg in view of U.S. Patent No. 6,572,641 to Brugger et al. ("Brugger"); rejected claims 12-13 under 35 U.S.C. § 103(a) as being unpatentable over Polaschegg in view of an American Journal of Kidney Disease article authored by Leypoldt et al. ("Leypoldt"); and rejected claims 14-15 under 35 U.S.C. § 103(a) as being unpatentable over Polaschegg in view of Leypoldt and further in view of Brugger.

By this Amendment, Applicant has amended claim 27 to more clearly recite the invention. Accordingly, claims 1-30 are pending in this application, of which 1-11 and 16-26 have been withdrawn. No new matter is added by this Amendment.

Applicant traverses the Examiner's rejection of claims 27-28 under 35 U.S.C. § 103(a) as being unpatentable over Polaschegg on multiple grounds. Polaschegg does not disclose or suggest each and every element of amended claim 27, for example. Moreover, the Examiner has improperly determined the scope and content of the prior art, in particular Polaschegg, and has failed to correctly ascertain the differences between Polaschegg and amended claim 27. Further, Applicant submits that many of the factual deficiencies of Polaschegg were identified by Applicant in the Reply to Office Action filed April 17, 2008, however, the Examiner either failed to consider these factual deficiencies in preparing the Final Office Action or failed to acknowledge them. Accordingly, Applicant will more clearly outline the most egregious

deficiencies of Polaschegg in this Amendment and will highlight the claim elements that are not disclosed or suggested by Polaschegg.

The Examiner contends that Polaschegg discloses "a filter (12) having a semipermeable membrane (14) separating a fluid compartment (16) from a blood compartment (12)." (Office Action at 2.) Applicant points out that the reference numeral for the blood compartment is actually (18), not (12), and notes that Polaschegg refers to reference numeral (12) as a dialyzer, not a filter. This distinction is relevant, because it appears that the Examiner has mixed up or mischaracterized the characteristics of the dialyzer 12 and the first and second sterile filters 44, 78 disclosed in Polaschegg. For example, the Examiner contends that Polaschegg discloses that "a water permeability coefficient of the filter (12) is at least 10 ml/min/mmHg (see figure; col. 3, line 16 - col. 6, line 65; col. 9, lines 22-63.)" (Id.) As discussed in the Reply to Office Action filed April 17, 2008, the Examiner's contention is absolutely incorrect. In fact, the passages of Polaschegg cited by the Examiner clearly support as much. It is indisputable that col. 3, line 16 - col. 4, line 32 is the only passage in Polaschegg that discloses any characteristics relating to water permeability of a filter. It is further indisputable that this same passage in Polaschegg refers exclusively to the characteristics of the first and second sterile filters (44, 78), not to the conventional dialyzer (12), as the Examiner contends.

These first and second sterile filters are configured to clean the dialysis solution (col. 6, lines 35-47) and not the blood, and thus, are not configured to have blood pumped through them. These sterile filters (44, 78) are merely ultra filters for cleaning replacement fluid before it is mixed with the blood, which is similar to dialyzer 40 as

disclosed in the present application. Sterile filters are effective for purifying water by removing bacteria, endotoxins, and other impurities, which is carried out in part by absorption in the membrane. Based on the fundamental differences between blood treatment dialyzers, which must be biocompatible and configured to reduce hemolysis and potential damage to blood cells, and sterile filters, one of ordinary skill in the art would not attempt to interchangeably replace sterile filters with blood dialyzers, as is apparently suggested by the Examiner. Further, Polaschegg does not provide any teaching that sterile filters (44, 78) and conventional dialyzers (12) are interchangeable. Moreover, the Examiner appears to have ignored a very important facet of dialyzer behavior. It is known to those of ordinary skill in the art that there is a fundamental difference in dialyzer behavior between suction from water and suction from blood. For example, in the article "A New Semiempirical Mathematical Model for Prediction of Internal Filtration in Hollow Fiber Hemodialyzers" (relevant portions of which were provided in the IDS filed along with the Reply to Office Action filed April 17, 2008) it is stated that the water permeability coefficient is consistently lower, by about one third, when suction is from blood rather than water. (See page 566, 2nd column, 1st paragraph.)

With respect to the sterile filters (44, 78), in which suction is from water, Polaschegg discloses "a semipermeable membrane . . . which has a water permeability of about 30-600 ml/(m^2 h mmHg), in particular about 100-300 ml/(m^2 h mmHg)." (Col. 3, lines 33-35.) As discussed in the Reply to Office Action filed April 17, 2008, the units of Polaschegg must be converted. Thus, if one assumes the maximum case disclosed in Polaschegg, where the surface area is 1.5 m^2 and the water permeability is 600 ml(m^2h

mmHg), the result is 600 x 1.5/60 = 15 ml/min/mmHg, **which must be divided by approximately a factor of 3** to obtain a water permeability value **when suction occurs from blood**. Accordingly, one of skill in the art would understand that the water permeability of the sterile filters disclosed in Polaschegg would actually be approximately **5 ml/min/mmHg**, if suction from blood were to occur through the same filter, as is the case in a conventional blood dialyzers. Thus, the Examiner's contention that "[a]s noted in applicant's argument on page 12 of the response, the water permeability is converted to be 15 ml/min/mmHg" is incorrect, careless, and blatantly mischaracterizes Applicant's previous Reply. In addition, Polaschegg does not disclose that the conventional dialyzer 12, through which blood flows, has a similar water permeability coefficient as the sterile filters. Thus, Polaschegg does not disclose a "filter that [has] a water permeability coefficient L_pA of at least 10 ml/min/mm Hg," as recited in amended claim 27 (emphasis added), wherein the "filter" has "a semipermeable membrane separating a fluid compartment from a blood compartment, provided with means for mixing blood and a cleaning fluid and directing said mixture through the blood compartment" (emphasis added), as recited in amended claim 27.

The Examiner also contends that the "[r]ecitation of 'configured to remove partially carrier bound substances from blood,' 'the cleaning fluid flow rate is at least 1000 ml/min and a ration between the cleaning fluid flow rate and blood flow rate is at least 5' is an intended use of the apparatus . . . [and thus] dose not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations." (Office Action at 2-3.) Applicant disagrees with the Examiner's characterization of the above claim elements as intended use. Applicant submits that

"configured to remove partially carrier bound substance from blood," as recited in amended claim 27, is part of the claim preamble and limits the structure of amended claim 27. Any terminology in the preamble that limits the structure of the claimed invention must be treated as a claim limitation, and thus, considered by an examiner. M.P.E.P. § 2111.02. The Federal Circuit has supported this view and has held that whether preamble recitations are structural limitations can be resolved only on review of the entirety of the application "to gain an understanding of what the inventors actually invented and intended to encompass by the claim." *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257, 9 USPQ2d 1962, 1966 (Fed. Cir. 1989) *See also*, *Poly-America LP v. GSE Lining Tech. Inc.*, 383 F.3d 1303, 1310, 72 USPQ2d 1685, 1689 (Fed. Cir. 2004). The current invention and entire application is directed to solving the problem of removing partially protein bound substances from the blood. Moreover, this application outlines the fundamental differences between removal of substances that are dissolved in body fluids, such as blood plasma, and the removal of large substances that are bound to carriers such as albumin. (See page 3, line 21 - page 4, line 7.) Thus, there is no question that the current invention provides a novel device and method for removing these large partially protein bound substances from the blood. Accordingly, Applicant requests that the Examiner give weight to this element of amended claim 27.

While Applicant disagrees that the other elements mentioned above are "intended use" recitations, as asserted by the Examiner, Applicant's submit that the proposed amendments to claim 27 to recite "the device is configured to sustain a cleaning fluid flow rate of at least 1000 ml/min to the filter" and "the device is configured

to maintain a ratio between the cleaning fluid flow rate and a blood flow rate to the filter of at least 5" moot this assertion. The claim term "configured" is defined as "to design, arrange, set up, or shape with a view to specific applications or uses,"[1] and thus, requires some sort of structural change in a device. Each of the above claim elements recites structural limitations of the device, recited in amended claim 27, which must be given weight. Even assuming, arguendo, that these claim elements were considered functional, the M.P.E.P. states that a "functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used. A functional limitation is often used in association with an element, ingredient, or step of a process to define a particular capability or purpose that is served by the recited element, ingredient or step." M.P.E.P. § 2173.05(g). Accordingly, Applicant requests that the Examiner reconsider amended claim 27, giving proper weight to all of the claim elements.

Moreover, Polaschegg does not disclose or suggest a "device [that] is configured to sustain a cleaning fluid flow rate of at least 1000 ml/min to the filter" and a "device [that] is configured to maintain a ratio between the cleaning fluid flow rate and a blood flow rate to the filter of at least 5," as recited in amended claim 27. Polaschegg discloses a hemofiltration system including predilution. It is known to those skilled in the art that a typical dialysis flow under such circumstances is approximately 25-50 liters per day of dialysis solution. It is also readily known that a typical dialysis treatment may be 4 hours per day. Thus, if 25-50 liters of dialysis solution are to be provided over 4

1 *The American Heritage® Dictionary of the English Language, Fourth Edition.* Houghton Mifflin Company, 2004.

hours, the cleaning fluid flow rate disclosed in Polaschegg for conventional hemofiltration with predilution would equal about 100-200 ml/min. As a result, the cleaning fluid flow rate disclosed by Polaschegg is 5-10 times less than the cleaning flow rate necessary to remove large partially protein bound substances, as required by amended claim 27. Accordingly, Applicant disagrees with the Examiner's contention that "[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the flow rate of cleaning fluid and a desired weight loss rate of patient." (Office Action at 3.) When confronted with the problem of removing partially protein bound substances from the blood, one skilled in the art would not look at Polaschegg and attempt to "optimize" the cleaning flow rate to achieve the claimed invention, because that would require increasing the flow rate by 5-10 times that used in normal hemofiltration with predilution. Not only would the dialyzer in Polaschegg be unable to handle such a high cleaning fluid flow rate, one skilled in the art would know that blood flow rate is the limiting factor for obtaining a high clearance, and thus, would not be motivated to increase the cleaning fluid flow rate above normal levels. Therefore, for at least these addition reasons, amended claim 27 is allowable over Polaschegg.

For at least the aforementioned reasons, amended independent claim 27 is allowable over the cited reference, and thus, the § 103(a) rejection of independent claim 27 should be withdrawn. Further, claim 28 is allowable over the cited reference at least due to its dependence from allowable independent claim 27. Accordingly, the rejection of claim 28 should also be withdrawn.

Applicant traverses the Examiner's rejection of claims 29 and 30 under 35 U.S.C. § 103(a) as being unpatentable over Polaschegg in view of Brugger.

Brugger discloses "[a]n external fluid warming device . . . that includes a fluid warming chamber and an air separation chamber. The fluid warming chamber has a fluid inlet that communicates with a fluid pathway. . . The fluid inlet is connected to a source of fluid and the fluid outlet is connected to an output device, such as an ultrafiltration machine." (Abstract.)

Brugger, however, does not disclose at least a "filter [that] has a water permeability coefficient L_pA of at least 10 ml/min/mm Hg," as recited in amended independent claim 27. Thus, Brugger does not cure the deficiencies of Polaschegg discussed above. Because claims 29 and 30 ultimately depend from independent claim 27, dependent claims 29 and 30 are allowable over the cited references and the § 103(a) rejection of claims 29 and 30 should be withdrawn.

Applicant also traverses the Examiner's rejection of claims 12 and 13 under U.S.C. § 103(a) as being unpatentable over Polaschegg in view of Leypoldt. Applicant submits that the cited references do not disclose or suggest each and every element of claim 12, for example. Moreover, Applicant submits that the Examiner has misinterpreted the scope of Leypoldt that this reference has been misapplied to claim 12. In particular, Leypoldt discloses a hemodialysis system (see page 575), while independent claim 12 is directed to a method for removing partially carrier bound substances through hemofiltration. Accordingly, one skilled in the art would not look to Leypoldt to cure any deficiencies in a reference such as Polaschegg (directed to

hemofiltration with predilution) to achieve the invention recited in claim 12. For at least this reason, claim 12 is allowable over the cited references.

Even assuming, arguendo, that it was proper to combine Polaschegg and Leypoldt, claim 12 is allowable over these references. The Examiner contends that Polaschegg discloses "a hemodiafiltration method comprising a blood circuit . . . a filter (12) . . . wherein a water permeability coefficient of the filter (12) is at least 10 ml/min/mmHg (see figure; col. 3, line 16 - col. 6, line 65; col. 9, lines 22-63)." (Office Action at 4.) As discussed above with respect to amended claim 27, Applicant disagrees. Polaschegg does not disclose a "filter that [has] a water permeability coefficient L_pA of at least 10 ml/min/mm Hg," as recited in claim 12 (emphasis added), wherein the "filter" has "a semipermeable membrane separating a fluid compartment from a blood compartment, provided with means for mixing blood and a cleaning fluid and directing said mixture through the blood compartment" (emphasis added), as recited in claim 12. The sterile filters in Polaschegg, if equipped to allow blood to flow therethrough (suction from blood), only disclose a water permeability of about 5 ml/min/mmHg. Leypoldt fails to cure this deficiency of Polaschegg. Accordingly, for at least this reason, claim 12 is allowable over the cited references. Thus, for at least this reason, claim 13 is allowable due at least to its dependence from allowable independent claim 12.

The Examiner further alleges that "Leypoldt et al teach that the urea and creatinine mass transfer area coefficients were independent of blood flow rate but increased when dialysate i.e. cleaning fluid was increased from 500 to 800 ml/min in high flux dialyzers (see abstract in page 575). Hence any dialysate flow greater than

1000 ml/min would further enhance mass transfer area coefficients of small solutes and the increased ratio between the dialysate flow rate and the blood flow rate would also enhance mass transfer area coefficients of small solutes for increased removal of small solutes through the membrane in high flux dialyzers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the dialysate flow rate as well as the ratio between the dialysate flow rate and the blood flow rate in the method of Polaschegg et al to arrive at optimal removal of small solutes by enhancing mass transfer coefficients of small solutes as suggested by Leypoldt et al" (emphasis added). (Office Action at 4.) Applicant strongly disagrees. In particular, as described by the Examiner, Leypoldt only teaches a method for removing small water soluble substance from blood. Moreover, Leypoldt is only directed to hemodialysis. Leypoldt does not, however, disclose or suggest, a method for removing partially carrier bound substances from blood, as recited in claim 12. It was known in the art at the time of the invention that hemodialysis treatments, as disclosed in Leypoldt, are only intended to remove small solutes from the blood, and thus, would not be analogous to the hemofiltration method recited in claim 12.

Moreover, Leypoldt does not teach or suggest that "the cleaning fluid flow rate is at least 1000 ml/min; and a ratio between the cleaning fluid flow rate and a blood flow rate is at least 5," as recited in claim 12. The Examiner attempts to equate the disclosure in Leypoldt that the cleaning fluid flow rate can be 800 ml/min, during hemodialysis treatment, with the requirement in claim 12 that the cleaning fluid flow rate be at least 1000 ml/min, during hemofiltration. Common sense indicates otherwise. No disclosure in Leypoldt suggests that the cleaning fluid flow rate be increased above

1000 ml/min as claimed. Despite this clear deficiency of Leypoldt, the Examiner has also ignored the difference in treatment type between Leypoldt (hemodialysis) and the pending claimed invention (hemofiltration). Applicant submits that such a comparison of cleaning fluid flow rates relating to different treatment types is improper. A proper comparison would require comparing the cleaning fluid flow rate during hemodialysis, as recited in originally-filed (withdrawn) claim 1 in this application, with the maximum cleaning flow rate disclosed in Leypoldt. During hemodialysis, originally-filed (withdrawn) claim 1 required the cleaning fluid flow rate to be at least 2000 ml/min in order to successfully remove partially carrier bound substances from the blood, while Leypoldt disclosed a corresponding cleaning fluid flow rate of only 800 ml/min. Accordingly, such a comparison further reveals the vast differences between Leypoldt and the disclosed invention, and more specifically, the differences between Leypoldt and the claimed invention. Also, as discussed in the Reply to Office Action filed April 17, 2008, the Examiner has confused clearance, which is the cleaning capacity of the dialyzer at the existing flow rate (blood and dialysis fluid), with k_0A. In theory, k_0A is a dialyzer constant that can be used together with the flow rates to calculate clearance. It is measured in ml/min, and is theoretically the clearance obtained at infinite flow rates (blood and dialysis fluid).

Leypoldt has shown that k_0A is not constant for dialysis flows of 500 to 800 ml/min. (Page 576.) Leypoldt states that this might be due to a bad distribution of the liquid in the dialyzer, an effect which becomes less dominant with higher flows. (Page 578.) The k_0A increases with an increase of the flow up to a certain lever, where k_0A stagnates. In large dialyzers typically used in dialysis treatments, and used in Leypoldt,

clearance is numerically often close to the blood flow rate. Increasing the k_0A of the dialyzer has a small influence on the clearance, which means that backwards calculation of k_0A from measured clearances and flow rates will result in large increases in calculated k_0A even for small increases in clearance.

Accordingly, Applicant disagrees with the Examiner's contention that clearance will continually increase with increased flow. As discussed above, clearance is not equivalent to k_0A except for the case of an infinite blood flow and dialysis fluid flow. However, even if clearance were equivalent to k_0A, the increase in k_0A with increased flow only goes up to a certain level, where k_0A stagnates. And even if k_0A increases, the clearance will not increase to any significant extent if the blood flow does not increase. One of skill in the art would recognize that clearance can never be larger than the blood flow in Leypoldt.

For the removal of partially protein bound substances, as recited in claim 12, the blood flow is not a limiting factor. In fact, in order to increase the removal of partially protein bound substances, the dialyzer size and the flow rate of the cleaning fluid should be increased simultaneously. The limiting factor of Leypoldt is the blood flow, and thus, an increased blood flow rate is the only way that Leypoldt could become more efficient or achieve better clearance.

For at least these additional reasons, Applicant submits that neither Polaschegg nor Leypoldt disclose or suggest "the cleaning fluid flow rate is at least 1000 ml/min; and a ratio between the cleaning fluid flow rate and a blood flow rate is at least 5," as recited in amended independent claim 12. Thus, amended independent claim 12 is allowable

over the prior art and the Examiner should withdraw this rejection. Also, because claim 13 depends from claim 12, the Examiner should withdraw the rejection of claim 13.

The Examiner also rejected claims 14 and 15 under U.S.C. § 103(a) as being unpatentable over Polaschegg in view of Leypoldt and further in view of Brugger. Applicant respectfully traverses this rejection.

As noted above, Brugger discloses "[a]n external fluid warming device . . . that includes a fluid warming chamber and an air separation chamber. The fluid warming chamber has a fluid inlet that communicates with a fluid pathway. . . The fluid inlet is connected to a source of fluid and the fluid outlet is connected to an output device, such as an ultrafiltration machine." (Abstract.)

Brugger, however, does not disclose or suggest that "a water permeability coefficient L_pA of the filter is at least 10 ml/min/mm Hg; the cleaning fluid flow rate is at least 1000 ml/min; and a ratio between the cleaning fluid flow rate and a blood flow rate is at least 5" as recited in claim 12. Thus, Brugger does not cure the deficiencies of Polaschegg and Leypoldt discussed above. Because dependent claims 14 and 15 ultimately depend from allowable independent claim 12, dependent claims 14 and 15 are allowable over the cited references and the § 103(a) rejection of claims 14 and 15 should be withdrawn.

Applicant respectfully requests that this Amendment under 37 C.F.R. § 1.116 be entered by the Examiner, placing claims 12-15 and 27-30 in condition for allowance. Applicant submits that the proposed amendments of claims 12-15 and 27-30 do not raise new issues or necessitate the undertaking of any additional search of the art by the Examiner, since all of the elements and their relationships claimed were either

earlier claimed or inherent in the claims as examined. Therefore, this Amendment should allow for immediate action by the Examiner.

Furthermore, Applicant respectfully points out that the final action by the Examiner presented some new arguments as to the application of the art against Applicant's invention. It is respectfully submitted that the entering of the Amendment would allow the Applicant to reply to the final rejections and place the application in condition for allowance. If you do not believe that the application is now in condition for allowance, please contact the undersigned at (202) 408-4387.

Finally, Applicant submits that this Amendmentplaces the application in better form for appeal, should the Examiner dispute the patentability of the pending claims.

In view of the foregoing remarks, Applicant submits that this claimed invention, as amended, is neither anticipated nor rendered obvious in view of the prior art references cited against this application. Applicant therefore requests the entry of this Amendment, the Examiner's reconsideration and reexamination of the application, and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to Deposit Account 06-0916.

Respectfully submitted,

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